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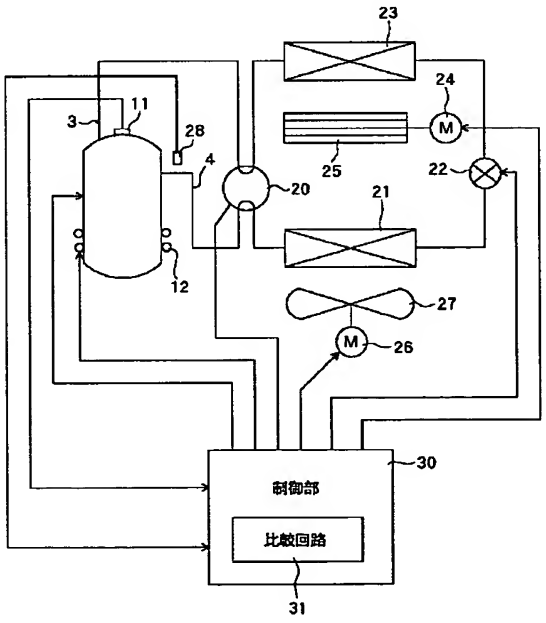
(54)【発明の名称】　冷凍・空気調和機

(57)【要約】

【課題】　冷凍・空気調和機の冷凍サイクルに用いられる圧縮機の潤滑油中に冷媒が混入して、潤滑油の濃度が低下するのを防止すること。

【解決手段】　圧縮機、非利用側熱交換器、減圧装置及び利用側熱交換器を順次接続された冷凍サイクルを有する冷凍・空気調和機において、前記圧縮機に設けられ該圧縮機を加熱するヒータ１２と、該圧縮機の温度を検知する温度センサ１１と、該圧縮機からの吐出ガスの凝縮温度を検知する吐出ガス凝縮温度センサ２８と、該温度センサ及び吐出ガス凝縮温度センサの検知温度に基づき制御手段３０により前記ヒータを制御し、圧縮機内における起動後の潤滑油の温度を吐出ガス凝縮温度より高い温度に維持して、圧縮機中の潤滑油に冷媒が混入するのを防止する。



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【特許請求の範囲】

【請求項１】　圧縮機、非利用側熱交換器、減圧装置及び利用側熱交換器を順次接続された冷凍サイクルを有する冷凍・空気調和機において、前記圧縮機に設けられ該圧縮機を加熱するヒータと、該圧縮機の温度を検知する温度センサと、該圧縮機からの吐出ガスの凝縮温度を検知する吐出ガス凝縮温度センサと、該温度センサ及び吐出ガス凝縮温度センサの検知温度に基づき、圧縮機内における起動後の潤滑油の温度を吐出ガス凝縮温度より高い温度に維持するように前記ヒータを制御する制御手段とを有することを特徴とする冷凍・空気調和機。

【請求項２】　圧縮機、非利用側熱交換器、減圧装置及び利用側熱交換器を順次接続された冷凍サイクルを有する冷凍・空気調和機において、前記圧縮機に設けられ該圧縮機を加熱するヒータと、該圧縮機の温度を検知する温度センサと、該圧縮機からの吐出ガスの凝縮温度を検知する吐出ガス凝縮温度センサと、該温度センサ及び吐出ガス凝縮温度センサの検知温度に基づき、圧縮機内における起動後の潤滑油の温度を吐出ガス凝縮温度より高い温度に維持するように該圧縮機の能力を制御する制御手段とを有することを特徴とする冷凍・空気調和機。

【請求項３】　請求項１記載の冷凍・空気調和機において、前記温度センサ及び吐出ガス凝縮温度センサの検知温度に基づき、圧縮機内における起動後の潤滑油の温度を吐出ガス凝縮温度より高い温度に維持するように該圧縮機の能力を制御する制御手段を有することを特徴とする冷凍・空気調和機。

【請求項４】　前記圧縮機の周囲に、該圧縮機を保温する保温材が設けられていることを特徴とする請求項１乃至３のいずれかに記載の冷凍・空気調和機。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、圧縮機、非利用側熱交換器、減圧装置及び利用側熱交換器を順次接続された冷凍サイクルを有する冷凍・空気調和機に関し、特に圧縮機の潤滑油の温度を吐出ガスの凝縮温度より高く維持するようにした冷凍・空気調和機に関する。

【０００２】

【従来の技術】従来の技術の一例は、特開平５－５３９５３号公報に記載のように、密閉形圧縮機であって、密閉容器内の低圧の吸入圧となっている構造において、スクロールに発生するスラスト力を処理するとともに旋回スクロールの軸受部に給油するのに好適な構造のものであるが、このような従来例では、圧縮機起動後の圧縮機内の潤滑油の温度、粘度等による、潤滑性に対しての考慮がなされていなかった。

【０００３】

【発明が解決しようとする課題】ところで、圧縮機の起動開始後の吐出ガスの凝縮温度より、圧縮機の潤滑を要する内部機構へ供給する潤滑油温度が低くなる場合は、

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吐出ガスの冷媒が潤滑油に溶け込み、潤滑油の粘度を低下させ、ひいては圧縮機内部機構の潤滑性を低下させ、内部機構の過熱や、摩耗の原因となる。

【０００４】本発明は、上記のような問題点を解決し、圧縮機の起動開始後のＴｃ（吐出ガス凝縮温度を意味し、以下、Ｔｃと略すことがある）より、圧縮機の内部機構や油溜り内の潤滑油温度が低下することのないようにし、潤滑性を確保し、信頼性を向上させる冷凍・空気調和機を提供することを目的とする。

【０００５】

【課題を解決するための手段】上記目的を達成するために、本出願の第１の発明は、圧縮機、非利用側熱交換器、減圧装置及び利用側熱交換器を順次接続された冷凍サイクルを有する冷凍・空気調和機において、前記圧縮機に設けられ該圧縮機を加熱するヒータと、該圧縮機の温度を検知する温度センサと、該圧縮機からの吐出ガスの凝縮温度を検知する吐出ガス凝縮温度センサと、該温度センサ及び吐出ガス凝縮温度センサの検知温度に基づき、圧縮機内における起動後の潤滑油の温度を吐出ガス凝縮温度より高い温度に維持するように前記ヒータを制御する制御手段とを有することを特徴とする。

【０００６】本出願の第２の発明は、圧縮機、非利用側熱交換器、減圧装置及び利用側熱交換器を順次接続された冷凍サイクルを有する冷凍・空気調和機において、前記圧縮機に設けられ該圧縮機を加熱するヒータと、該圧縮機の温度を検知する温度センサと、該圧縮機からの吐出ガスの凝縮温度を検知する吐出ガス凝縮温度センサと、該温度センサ及び吐出ガス凝縮温度センサの検知温度に基づき、圧縮機内における起動後の潤滑油の温度を吐出ガス凝縮温度より高い温度に維持するように該圧縮機の能力を制御する制御手段とを有することを特徴とする。

【０００７】本出願の第３の発明は、第１の発明における冷凍・空気調和機において、前記温度センサ及び吐出ガス凝縮温度センサの検知温度に基づき、圧縮機内における起動後の潤滑油の温度を吐出ガス凝縮温度より高い温度に維持するように該圧縮機の能力を制御する制御手段を有することを特徴とする。

【０００８】本出願の第４の発明は、第１乃至３のいずれかにおける前記圧縮機の周囲に、該圧縮機を保温する保温材が設けられていることを特徴とする。

【０００９】

【発明の実施の形態】以下、本発明の一実施形態をスクロール圧縮機を用いた空気調和機の例により、図１～図３を参照して説明する。

【００１０】図において、圧縮機１は、ケーシング２を有し、該ケーシング内には、スクロール圧縮機構部５、モータ９、該モータの駆動力を圧縮機構部５に伝達するための、コロ軸受６、下軸受７により回転自在に支持されたクランクシャフト８等が内蔵され、ケーシングの下

部には潤滑油溜り１０が形成されている。また、ケーシング２には、吸入管３及び吐出管４が固定され、ケーシング２の上部に圧縮機の温度センサ１１が設けられ、ケーシング外周の上部及び下部にヒータ１２が巻装されている。

【００１１】次に上記のような圧縮機１を搭載する空気調和機の例について説明する。圧縮機１の起動後、冷媒は、吸入管３より圧縮機構部５の圧縮室に入り圧縮され、ケーシング２内壁、モータ９のステータ外周の間隙を通って潤滑油溜り１０と接し、その潤滑油と熱交換した後、モータのロータ、ステータ間を通り、吐出管４より吐出される。

【００１２】吐出管４から吐出された冷媒は、四方弁２０、室外の非利用側熱交換器２１を通り、モータ２６で駆動されるファン２７により空気で冷却され、減圧装置である膨張弁２２、室内の利用側熱交換器２３へ送られ、そこでモータ２４で駆動される室内ファン２５により送風される室内空気と熱交換される。その後冷媒は、四方弁２０を通って圧縮機の吸入管３へ戻る。

【００１３】次に、Ｔｃ（吐出ガス凝縮温度）と、潤滑油溜り１０の油温（油温１、油温２）の経過時間による変化を図２に示す。特に油温の温度制御等をしない通常の場合、圧縮機１の起動直前の時間ｔ０では、油溜り１０の油温は、Ｔｃより高温であるが、ある時間ｔ１（例えば約２０分）まで、油温は下降し、その後上昇し、時間ｔ３で安定する傾向にある。他方、Ｔｃ（吐出ガス凝縮温度）は起動直後は急上昇しその後温度上昇が緩やかになり時間ｔ２で安定する傾向にある。

【００１４】即ち起動直後からＴｃが安定するまでの間、圧縮機１内の吐出ガス温度は、ケーシング２内壁、モータ９、クランクシャフト８、油溜り１０等の温度より低いため、吐出ガスは圧縮室５から、吐出管４を出るまでの間、熱を奪うことになり、油温は上記のような下降傾向を示す。もし油溜り１０内の起動直前までの保温が不十分の場合は、油温１の如く、油温がＴｃ（吐出ガスの凝縮温度）より低温になり、吐出ガスである冷媒が凝縮し、その冷媒が潤滑油と混ざり合い、油の粘度を低下させることになり、圧縮機１内の圧縮室５、コロ軸受６、下軸受７、クランクシャフト８等の潤滑を低下させ、摺動部過熱や摩耗の原因となる。

【００１５】本発明では上記のような潤滑低下を防止するために油温制御がなされる。本実施形態では制御部３０により潤滑油をヒータ１２により加熱制御し、図２の油温２の如く変化させ、油温をＴｃより高い温度に維持する。そのための制御の一例は次のようになされる。温度センサ１１は圧縮機に設けられ、また、吐出管４に圧力センサ２８が設けられ、該圧力センサ２８による検知吐出圧力から凝縮温度が換算される。起動直後ｔ０から一定時間間隔でセンサ１１、２８により油温及び吐出ガス圧力が検知され、その検知信号は制御部３０の比較回路３１に入力される。その場合吐出圧から換算された吐出ガス凝縮温度に相当する信号が比較回路に入力される。比較回路３１では油温とＴｃの比較が行われ、その差が各時間における所定値より小さい場合は、制御部３０からヒータ１２ＯＮの信号が出されて、ヒータによる加熱が行われる。また逆に前記差が所定値より大なる場合は、ヒータＯＦＦの信号が出力されヒータによる加熱は行われない。このような制御は、油温の最低予想時間ｔ１まで行われるが、その後の制御を続けてもよい。以上のように本実施形態によれば、油温及び吐出ガス凝縮温度を検知し、その検知結果に基づき油温を加熱制御するので、常に油温を吐出ガス凝縮温度以上に維持し、冷媒が潤滑油内に混入することを防止することができる。

【００１６】（実施形態２）次に本発明の第２の実施形態について図３、４、５を参照して説明する。本実施形態では、圧縮機１の周囲に保温材１３が巻装されており、前記実施形態同様、一定の短時間間隔でセンサ１１及び２８により、油温及び吐出圧凝縮温度Ｔｃ１が検知され、両温度は、比較回路３１により比較される。そして本実施形態では、比較された温度差が所定値より小さい場合は、制御部３０により例えばインバータ回路を介して圧縮機の回転数を変化させて、圧縮機の能力即ち吐出量を低下させる。その結果、吐出ガス凝縮温度を図４のＴｃ１のように変化させ、油温を吐出ガス凝縮温度以上に維持し、冷媒の油中への混入を防止することができる。

【００１７】（実施形態３）本実施形態では、図５の如く、圧縮機１をヒータ１２で加温し、保温材１３にて保温し、前記実施形態１、２におけるヒータによる加熱制御、及び圧縮機の能力制御を組合せることにより、冷媒の油中への混入を防止するものである。なお、本実施形態の場合、保温材を省略してもよい。

【００１８】以上の各実施形態では、ヒータ１２はケーシング外周の上部及び下部に設けられ、温度センサ１１はケーシングの上部に設けられるが、これらヒータ及び温度センサは油溜り１０の内部やその近傍に設けても良く、また、吐出ガス凝縮温度は、吐出圧力センサに代えて、吐出ガス凝縮温度を検知するセンサを利用側熱交換器に設けて直接検知するようにしてもよい。また、本発明は、空気調和機のみではなく、冷凍機としても実施することができ、圧縮機としては、スクロール圧縮機以外のロータリ圧縮機を用いることができる。

【００１９】

【発明の効果】以上説明したように、本発明によれば、圧縮機内の油温の加熱制御又は圧縮機の能力制御を行うことにより、常に油温を吐出ガス温度以上に維持し、冷媒の油中への混入を防止し、圧縮機内部での潤滑不良による、異常過熱、異常摩耗等を防止することができる。

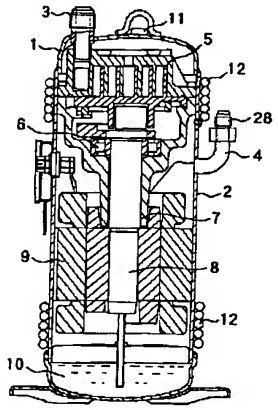
【図面の簡単な説明】

【図１】本発明に係る一実施形態の圧縮機部の構造を示

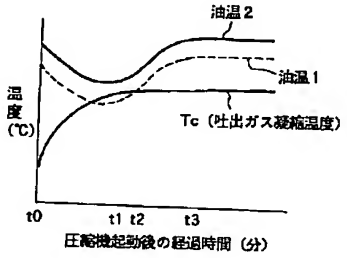
す図
【図２】圧縮機運転時の時間経過と吐出ガス凝縮温度及び潤滑油温度の関係を示す図
【図３】本発明に係る本発明に係る一実施形態の空気調和機の概略図
【図４】本発明に係る第２の実施形態の圧縮機運転時の時間経過と吐出ガス凝縮温度及び潤滑油温度の関係を示す図
【図５】本発明に係る第２の実施形態の圧縮機部の構造を示す図
【図６】本発明に係る第３の実施形態の圧縮機部の構造＊を示す図

【符号の説明】
１…圧縮機　２…ケーシング
３…吸入管　４…吐出管
５…圧縮室　６…コロ軸受
７…下軸受　８…クランクシャフト
９…モータ　１０…油溜り
１１…圧縮機温度センサー　１２…ヒータ
１３…保温材　２８…吐出圧センサ
３０…制御部　３１…比較回路

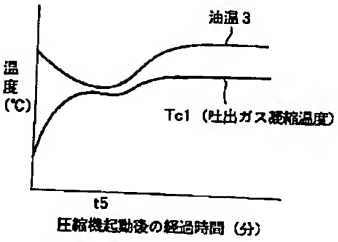
【図１】



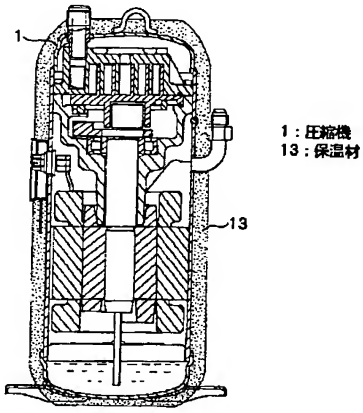
【図２】



【図４】



【図５】



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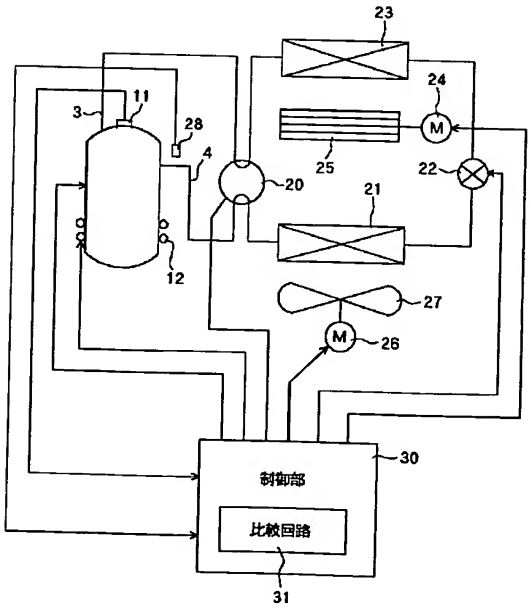

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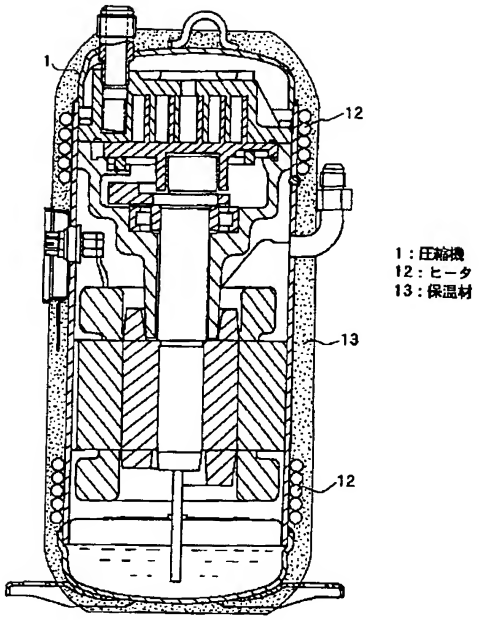

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Epitome

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(57) [Abstract]
[Technical problem] Prevent that a refrigerant mixes and the concentration of a lubricating oil falls into the lubricating oil of the compressor used for the refrigerating cycle of refrigeration and an air conditioner.
[Means for Solution] The heater 12 which is formed in said compressor and heats this compressor in the refrigeration and the air conditioner which has the refrigerating cycle by which sequential connection was made in the compressor, the un-using side heat exchanger, the decompression device, and the use side heat exchanger, It prevents that control said heater by the control means 30 based on the detection temperature of the temperature sensor 11 which detects the temperature of this compressor, the regurgitation gas condensation temperature sensor 28 which detects the condensation temperature of the regurgitation gas from this compressor, and a this temperature sensor and a regurgitation gas condensation temperature sensor, maintain the temperature of the lubricating oil after starting in a compressor to temperature higher than regurgitation gas condensation temperature, and a refrigerant mixes in the lubricating oil in a compressor.

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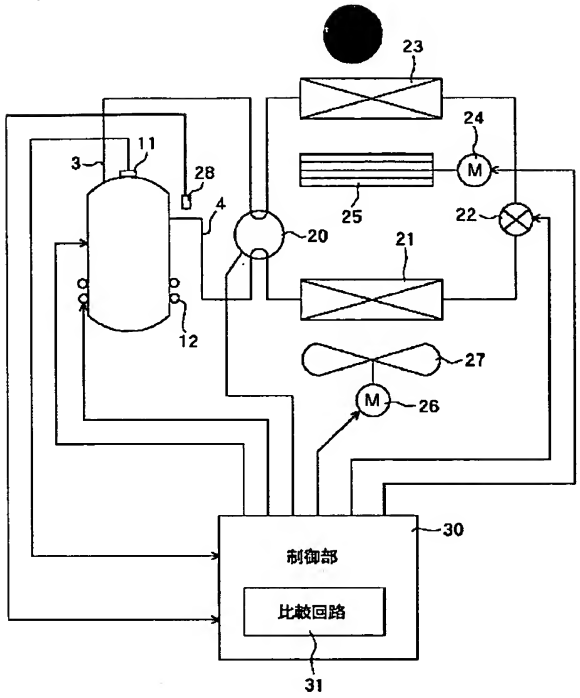

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CLAIMS

[Claim(s)]
[Claim 1] The refrigeration and the air conditioner which has the refrigerating cycle by which sequential connection was made in the compressor and un-using side heat exchanger which are characterized by providing the following, the decompression device, and the use side heat exchanger The heater which is formed in said compressor and heats this compressor The temperature sensor which detects the temperature of this compressor The regurgitation gas condensation temperature sensor which detects the condensation temperature of the regurgitation gas from this compressor The control means which controls said heater to be based on the detection temperature of this temperature sensor and a regurgitation gas condensation temperature sensor, and to maintain the temperature of the lubricating oil after starting in a compressor to temperature higher than regurgitation gas condensation temperature
[Claim 2] The refrigeration and the air conditioner which has the refrigerating cycle by which sequential connection was made in the compressor and un-using side heat exchanger which are characterized by providing the following, the decompression device, and the use side heat exchanger The heater which is formed in said compressor and heats this compressor The temperature sensor which detects the temperature of this compressor The regurgitation gas

condensation temperature sensor which detects the condensation temperature of the regurgitation gas from this compressor The control means which controls the capacity of this compressor to be based on the detection temperature of this temperature sensor and a regurgitation gas condensation temperature sensor, and to maintain the temperature of the lubricating oil after starting in a compressor to temperature higher than regurgitation gas condensation temperature
[Claim 3] The refrigeration and the air conditioner characterized by having the control means which controls the capacity of this compressor to be based on the detection temperature of said temperature sensor and a regurgitation gas condensation temperature sensor, and to maintain the temperature of the lubricating oil after starting in a compressor to temperature higher than regurgitation gas condensation temperature in refrigeration and an air conditioner according to claim 1.
[Claim 4] The refrigeration and the air conditioner according to claim 1 to 3 characterized by forming the heat insulating material which keeps this compressor warm in the perimeter of said compressor.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the refrigeration and the air conditioner which maintained especially the temperature of the lubricating oil of a compressor more highly than the condensation temperature of regurgitation gas about the refrigeration and the air conditioner which has the refrigerating cycle by which sequential connection was made in the compressor, the un-using side heat exchanger, the decompression device, and the use side heat exchanger.
[0002]
[Description of the Prior Art] Although an example of a Prior art was a sealing form compressor like the publication to JP,5-53953,A, and it was the thing of suitable structure to refuel bearing of revolution scrolling while processing the thrust force generated in scrolling in the structure used as the low-pressure inlet pressure in a well-closed container, in such a conventional example, the consideration to lubricity by the temperature of the lubricating oil in the compressor after compressor starting, viscosity, etc. was not made.
[0003]
[Problem(s) to be Solved by the Invention] By the way, when the lubricating oil temperature supplied to the internal device in which the lubrication of a compressor is required becomes low, the refrigerant of regurgitation gas reduces the viscosity of penetration and a lubricating oil to a lubricating oil, as a result reduces the lubricity of the interior device of a compressor, and becomes overheating of an internal device, and the cause of wear from the condensation temperature of the regurgitation gas after starting initiation of a compressor.
[0004] This invention solves the above troubles, it is made for neither the internal device of a

compressor nor the lubricating oil temperature in an oil sump to fall, and it secures lubricity from Tc after starting initiation of a compressor (regurgitation gas condensation temperature is meant and it may abbreviate to Tc hereafter), and aims at offering the refrigeration and the air conditioner which raises dependability.

[0005]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention of the 1st of this application In the refrigeration and the air conditioner which has the refrigerating cycle by which sequential connection was made in the compressor, the un-using side heat exchanger, the decompression device, and the use side heat exchanger The heater which is formed in said compressor and heats this compressor, and the temperature sensor which detects the temperature of this compressor, The regurgitation gas condensation temperature sensor which detects the condensation temperature of the regurgitation gas from this compressor, It is based on the detection temperature of this temperature sensor and a regurgitation gas condensation temperature sensor, and is characterized by having the control means which controls said heater to maintain the temperature of the lubricating oil after starting in a compressor to temperature higher than regurgitation gas condensation temperature.

[0006] In the refrigeration and the air conditioner which has the refrigerating cycle by which sequential connection of the invention of the 2nd of this application was made in the compressor, the un-using side heat exchanger, the decompression device, and the use side heat exchanger The heater which is formed in said compressor and heats this compressor, and the temperature sensor which detects the temperature of this compressor, The regurgitation gas condensation temperature sensor which detects the condensation temperature of the regurgitation gas from this compressor, It is based on the detection temperature of this temperature sensor and a regurgitation gas condensation temperature sensor, and is characterized by having the control means which controls the capacity of this compressor to maintain the temperature of the lubricating oil after starting in a compressor to temperature higher than regurgitation gas condensation temperature.

[0007] In the refrigeration and the air conditioner in the 1st invention, invention of the 3rd of this application is based on the detection temperature of said temperature sensor and a regurgitation gas condensation temperature sensor, and is characterized by having the control means which controls the capacity of this compressor to maintain the temperature of the lubricating oil after starting in a compressor to temperature higher than regurgitation gas condensation temperature.

[0008] Invention of the 4th of this application is characterized by forming the heat insulating material which keeps this compressor warm in the perimeter of said compressor in either the 1st thru/or 3.

[0009]

[Embodiment of the Invention] Hereafter, the example of the air conditioner using a scrolling compressor explains 1 operation gestalt of this invention with reference to drawing 1 - drawing 3 .

[0010] In drawing, a compressor 1 has casing 2, the crankshaft 8 grade supported by the roller bearing 6 for transmitting the driving force of the scrolling compression device section 5, a motor 9, and this motor to the compression device section 5 and the lower-shaft carrier 7 free [rotation] is built in in this casing, and the lubrication oil sump 10 is formed in the lower part of casing. Moreover, a suction pipe 3 and a discharge tube 4 are fixed to casing 2, the temperature sensor 11 of a compressor is formed in the upper part of casing 2, and the upper part and the lower part of a casing periphery are looped around the heater 12.

[0011] Next, the example of the air conditioner which carries the above compressors 1 is explained. After starting of a compressor 1, after a refrigerant is entered and compressed into the compression space of the compression device section 5 from a suction pipe 3, touches the lubrication oil sump 10 through the gap of casing 2 wall and the stator periphery of a motor 9 and carries out heat exchange to the lubricating oil, it passes along between Rota of a motor, and a stator, and is breathed out from a discharge tube 4.

[0012] It passes along a four way valve 20 and the outdoor un-using side heat exchanger 21, and

is cooled with air by the fan 27 who drives by the motor 26, the refrigerant breathed out from the discharge tube 4 is sent to the expansion valve 22 which is a decompression device, and the indoor use side heat exchanger 23, and heat exchange is carried out to the indoor air ventilated by the indoor fan 25 who drives by the motor 24 there. A refrigerant returns to the suction pipe 3 of a compressor through a four way valve 20 after that.

[0013] Next, change by the elapsed time of the oil temperature (an oil temperature 1, oil temperature 2) of the lubrication oil sump 10 is indicated to be Tc (regurgitation gas condensation temperature) to drawing 2 . In the usual case which does not especially carry out temperature control of an oil temperature etc., in the time amount t0 in front of starting of a compressor 1, the oil temperature of an oil sump 10 is an elevated temperature from Tc, but to a certain time amount t1 (for example, about 20 minutes), an oil temperature descends, rises after that and is in the inclination stabilized in time amount t3. On the other hand, immediately after starting, it goes abruptly up, a temperature rise becomes loose after that, and Tc (regurgitation gas condensation temperature) is in the inclination stabilized in time amount t2.

[0014] That is, since the regurgitation gas temperature in a compressor 1 is lower than the temperature of casing 2 wall, a motor 9, a crankshaft 8, and oil sump 10 grade, regurgitation gas will take heat until it comes out of a discharge tube 4 from compression space 5, and an oil temperature shows the above downward inclinations, until Tc is stabilized from immediately after starting. When incubation until just before starting in an oil sump 10 is inadequate, like an oil temperature 1, an oil temperature turns into low temperature from Tc (condensation temperature of regurgitation gas), the refrigerant which is regurgitation gas condenses, and the refrigerant is mixed with a lubricating oil, makes the viscosity of an oil fall, reduces the lubrication of the compression space 5 in a compressor 1, roller bearing 6, the lower-shaft carrier 7, and crankshaft 8 grade, and causes sliding section overheating and wear.

[0015] In this invention, in order to prevent the above lubrication falls, oil-temperature control is made. With this operation gestalt, by the control section 30, at a heater 12, heating control is carried out, a lubricating oil is changed like the oil temperature 2 of drawing 2 , and an oil temperature is maintained to temperature higher than Tc. An example of control for that is made as follows. A temperature sensor 11 is formed in a compressor, and a pressure sensor 28 is formed in a discharge tube 4, and condensation temperature is converted from the detection discharge pressure by this pressure sensor 28. An oil temperature and regurgitation gas pressure are detected by sensors 11 and 28 with a fixed time interval from immediately after [t0] starting, and the detection signal is inputted into the comparator circuit 31 of a control section 30. In that case, the signal equivalent to the regurgitation gas condensation temperature converted from the discharge pressure is inputted into a comparator circuit. The comparison of an oil temperature and Tc is performed, when the difference is smaller than the predetermined value in each time amount, the signal of heater 12ON is taken out with a comparator circuit 31 from a control section 30, and heating at a heater is performed in it. Moreover, when said difference consists of a predetermined value size conversely, the signal of Heater OFF is outputted and heating at a heater is not performed. Subsequent control may be continued although such control is performed to the minimum anticipation time amount t1 of an oil temperature. Since an oil temperature and regurgitation gas condensation temperature are detected and heating control of the oil temperature is carried out based on the detection result according to this operation gestalt as mentioned above, an oil temperature can always be maintained more than regurgitation gas condensation temperature, and it can prevent that a refrigerant mixes in a lubricating oil.

[0016] (Operation gestalt 2) The 2nd operation gestalt of this invention is explained with reference to drawing 3 , and 4 and 5 below. With this operation gestalt, the perimeter of a compressor 1 is looped around heat insulating material 13, like said operation gestalt, at intervals of a fixed short time, an oil temperature and the discharge-pressure condensation temperature Tc 1 are detected by sensors 11 and 28, and both temperature is measured by the comparator circuit 31. And with this operation gestalt, when the compared temperature gradient is smaller than a predetermined value, the rotational frequency of a compressor is changed through an inverter circuit by the control section 30, and it reduces, the capacity, i.e., the discharge

quantity, of a compressor. Consequently, regurgitation gas condensation temperature can be changed like Tc1 of drawing 4 , an oil temperature can be maintained more than regurgitation gas condensation temperature, and mixing into the oil of a refrigerant can be prevented.
[0017] (Operation gestalt 3) With this operation gestalt, like drawing 5 , a compressor 1 is warmed at a heater 12, it is kept warm with heat insulating material 13, and mixing into the oil of a refrigerant is prevented by combining the heating control at the heater in said operation gestalten 1 and 2, and capacity control of a compressor. In addition, in the case of this operation gestalt, heat insulating material may be omitted.
[0018] Although it is prepared in the upper part and the lower part of a casing periphery and a temperature sensor 11 is formed in the upper part of casing, a heater 12 may form these heaters and a temperature sensor the interior and near [its] the oil sump 10, and the sensor which detects regurgitation gas condensation temperature is formed in a use side heat exchanger, and you may make it replace with a discharge-pressure sensor and regurgitation gas condensation temperature detect it directly with each above operation gestalt. Moreover, this invention can be carried out also not only as an air conditioner but as a refrigerator, and rotary compressors other than a scrolling compressor can be used for it as a compressor.
[0019]
[Effect of the Invention] As explained above, according to this invention, by performing heating control of the oil temperature in a compressor, or capacity control of a compressor, an oil temperature can always be maintained more than regurgitation gas temperature, mixing into the oil of a refrigerant can be prevented, and abnormality overheating by the poor lubrication inside a compressor, anomalous attrition, etc. can be prevented.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing the structure of the compressor section of 1 operation gestalt concerning this invention
[Drawing 2] Drawing showing the relation between the time amount progress at the time of compressor operation, regurgitation gas condensation temperature, and lubricating oil temperature
[Drawing 3] The schematic diagram of the air conditioner of 1 operation gestalt concerning this invention concerning this invention
[Drawing 4] Drawing showing the relation between the time amount progress at the time of compressor operation of the 2nd operation gestalt concerning this invention, regurgitation gas condensation temperature, and lubricating oil temperature
[Drawing 5] Drawing showing the structure of the compressor section of the 2nd operation gestalt concerning this invention
[Drawing 6] Drawing showing the structure of the compressor section of the 3rd operation gestalt concerning this invention

[Description of Notations]
1 -- Compressor 2 -- Casing
3 -- Suction pipe 4 -- Discharge tube
5 -- Compression space 6 -- Roller bearing
7 -- Lower-shaft carrier 8 -- Crankshaft
9 -- Motor 10 -- Oil sump
11 -- Compressor thermo sensor 12 -- Heater
13 -- Heat insulating material 28 -- Discharge-pressure sensor
30 -- Control section 31 -- Comparator circuit

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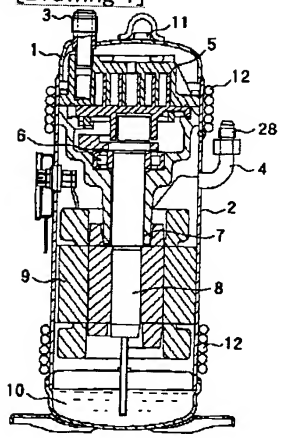
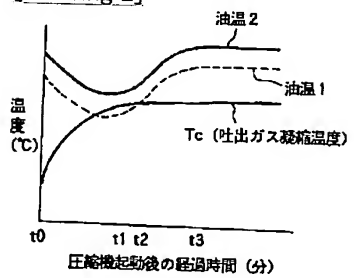
DRAWINGS

[Drawing 1]



[Drawing 2]



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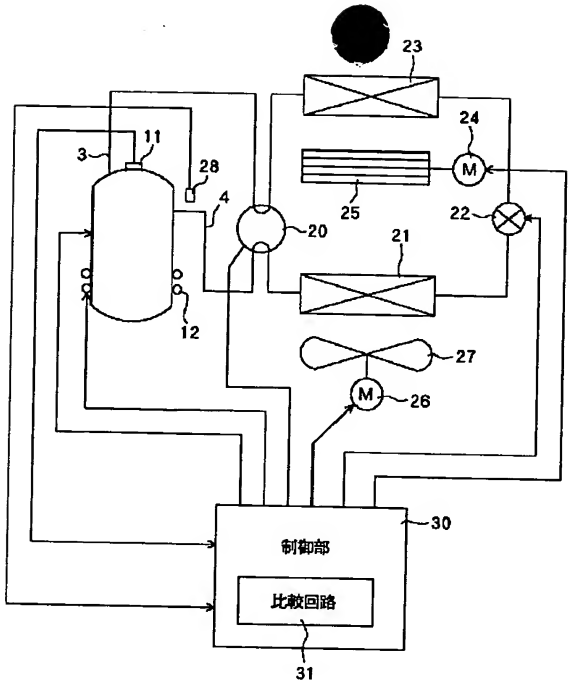
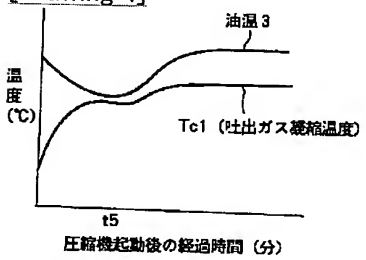
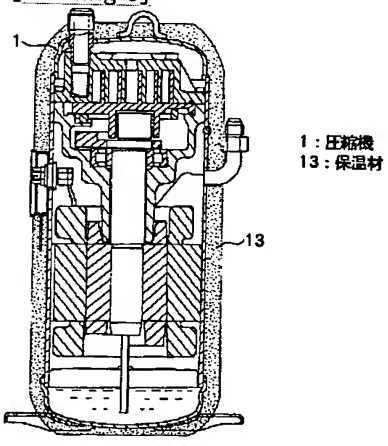


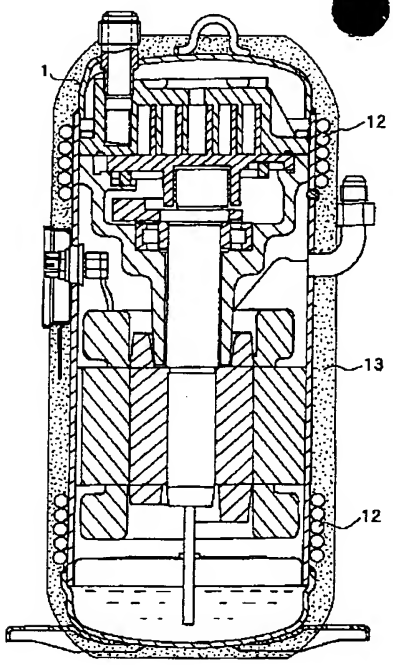
[Drawing 4]



[Drawing 5]



[Drawing 6]



1：圧縮機
12：ヒータ
13：保温材

[Translation done.]